

REMARKS

This is in response to the Office Action of 22 October 2004. Claims 1-2, and 4-35 are pending in the application, and Claims 1-2, and 4-35 have been rejected.

By this Response and Amendment, Claim 18 has been cancelled, and Claims 1-2, 4, 17, 19 and 25 have been amended.

No new matter has been added.

In view of the amendments above and remarks below, Applicants respectfully request reconsideration and further examination.

About The Invention

The present invention relates generally to methods and apparatus for detecting irradiation of a circuit, and for preventing the irradiation from causing a breach of security. The present invention more particularly relates to including a bipolar transistor photo-detector disposed in the substrate of a chip at the same level, or plane, in which the data and circuits that require protection are located. In this way, detection is provided not only from front side irradiation, but also from backside irradiation through the semiconductor substrate in which the circuits and photo-detectors are located. By locating the bipolar photo-detectors at the same position in the substrate as the circuits and data needing protection, detection of an irradiation condition is made at the same time at which the other circuits are being exposed rather than afterward, as would be the case with surface mounted irradiation detectors when the backside of the chip is irradiated.

Rejections under 35 USC §103(a)

Claims 1-2, and 4-35 have been rejected under 35 USC §103(a) as being unpatentable over Schrenk (US Patent 4,910,707), in view of Berger, et al., (US Patent 5,225,706) and Hayami, et al., (US Patent 6,426,495).

By this amendment, Claim 18 has been cancelled, thereby rendering moot the rejection of Claim 18.

Also by this amendment, independent Claims 1, 19, and 25 have been amended to recite the limitation that the bipolar transistor is disposed in the plane of the data or functions to be protected. As disclosed in Applicants' specification, the claimed position of the bipolar transistor advantageously provides for detection of irradiation from the backside of the chip, as well as detection of front-side irradiation that penetrates the absorbing and reflecting dielectric layers on the topside of the chip. Such backside irradiation is possible when the chip is removed from a card (e.g., a smart card) in which it is typically packaged. Support for these amendments can generally be found throughout the specification, and can more particularly be found at page 3, lines 16-23.

Applicants respectfully submit that the cited references do not appear to provide this teaching, nor do they provide a suggestion or motivation for such an arrangement. The photo-transistors disclosed by Berger, et al., are actually located above an insulating substrate that is transparent to light, and coated at top and bottom with transparent metal. This teaches away from Applicants' structure in which the bipolar transistor is disposed with the circuits that are to be protected from, not exposed to, light.

With respect to Claim 17, the Examiner notes that recitation of intended function does not differentiate a claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Although Claim 17 now inherits the newly recited limitations of its base Claim, Applicants have further amended Claim 17 so that it more clearly recites that the circuit arrangement further comprises a substrate in the form of a card.

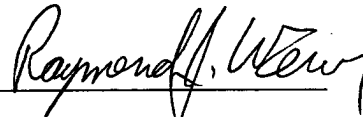
In view of the foregoing, Applicants respectfully submit that the rejection Claims 1, 19, and 25 has been overcome. Similarly, Applicants submit that the rejection of Claims 2, and 4-17; 20-24; and 26-35, which depend respectively from amended Claims 1, 19, and 25, has been overcome.

Conclusion

All of the rejections in the outstanding Office Action of 22 October 2004 have been responded to, and Applicants respectfully submit that the pending Claims 1-2, 4-17, and 19-35 are now in condition for allowance.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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